# CLAIMS

What is claimed is:

1. A new method for producing phycoerythrin with high optical density (OD), comprising the following steps:

cultivating a gametophyte with mature tetrasporangia in a medium to obtain tetraspores therefrom;

cultivating said tetraspores in a condition that the temperature, light intensity and light/dark ratio are respectively 15-30℃, 500 lux-6000 lux and above 10:14 to germinate filaments;

collecting said cultivated filaments;

adding said cultivated filaments to a liquid solution with the pH value of 5-10;

obtaining a clear-red pigment protein solution containing phycoerythrin by centrifuging said liquid solution at 6000 rpm for 10 minutes at 4℃; and

salting out the gel-form phycoerythrin concentrate from said clear-red pigment protein solution, wherein said gametophyte selected from an algae whose life cycle has sexual reproduction, asexual reproduction, and vegetative propagation.

2. The method according to claim 1, wherein said algae is selected from the group consisting of Galaxaura oblongata, Halymenia ceylanica, Helminthocladia australis, and Porphyra dentata.

3. The method according to claim 2, wherein chromatography spectrogram at 565 nm of phycoerythrin extracted from said cultivated filaments of Galaxaura oblongata carpospores measured by High Performance Liquid Chromatography (HPLC) is shown as the Figure 7B.

4. The method according to claim 2, wherein chromatography spectrogram at 565 nm of phycoerythrin extracted from said cultivated filaments of Halymenia ceylanica carpospores measured by High Performance Liquid Chromatography (HPLC) is shown as the Figure 8B.

5. The method according to claim 2, wherein chromatography spectrogram at 565 nm of phycoerythrin extracted from said cultivated filaments of Helminthocladia australis carpospores measured by High Performance Liquid Chromatography (HPLC) is shown as the Figure 9B.

6. The method according to claim 2, wherein chromatography spectrogram at 565 nm of phycoerythrin extracted from said cultivated filaments of Porphyra dentata carpospores measured by High Performance Liquid Chromatography (HPLC) is shown as the Figure 10B.

7. The method according to claim 1, wherein said medium is a SWM-III medium.

8. The method according to claim 7, wherein said SWM-III medium is an inorganic SWM-III medium.

9. The method according to claim 1, wherein the step of cultivating said tetraspores to germinate filaments further comprises:

breaking up said filaments into minute segments and cultivating them in a larger tank in the same condition until the cultivated filaments grow to the required amounts, wherein said tank is supplied with the fresh air for keeping said minute segments to be suspended in the medium.

10. The method according to claim 1, wherein the better temperature, light intensity and light/dark ratio of said condition are respectively 20℃, 2000 lux, and 12:12.

11. The method according to claim 1, wherein the step of collecting said cultivated filaments further comprises:

collecting said cultivated filaments by a net of 20-400 mesh;

drying said cultivated filaments; and

grinding said cultivated filaments into powder.

12. The method according to claim 1, wherein the method of drying said cultivated filaments is selected from the group consisting of the vacuum method or the warm air method.

13. The method according to claim 1, wherein said liquid solution consists of water and potassium phosphate.

14. The method according to claim 1, wherein the step of salting out the gel-form phycoerythrin further comprises:

adding the 20% solution of (NH.sub.4).sub.2 SO.sub.4 to said clear-red pigment protein solution; and

centrifuging said clear-red pigment protein solution at 6000 rpm for 10 minutes at 4℃ for separating the unwanted proteins to obtain a purer pigment protein solution.

15. The method according to claim 14, wherein the step of salting out the gel-form phycoerythrin further comprises:

adding the 60~65% solution of (NH.sub.4).sub.2 SO.sub.4 to said purer pigment protein solution; and

centrifuging said purer pigment protein solution at 6000 rpm for 10 minutes at 4 ℃ to obtain the gel-form phycoerythrin concentrate.

16. The method according to claim 15, wherein the step of salting out the gel-form phycoerythrin further comprises:

dialyzing said gel-form phycoerythrin concentrate and purifying the phycoerythrin by gel filtration therefrom.

17. The method according to claim 16, wherein the gel filtration is a Sephadex G200 gel filtration.

18. The method according to claim 15, wherein the step of salting out the gel-form phycoerythrin further comprises:

purifying said gel-form phycoerythrin concentrate by ultrafiltration therefrom.